



(11) **EP 2 168 638 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
31.03.2010 Bulletin 2010/13

(51) Int Cl.:
A62D 1/06 (2006.01) A62C 3/00 (2006.01)

(21) Application number: **07845653.0**

(86) International application number:
PCT/CN2007/003212

(22) Date of filing: **14.11.2007**

(87) International publication number:
WO 2009/006767 (15.01.2009 Gazette 2009/03)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(72) Inventors:
• **GUO, Hongbao**
Xi'an, Shaanxi 710075 (CN)
• **ZHANG, Zanfeng**
Xi'an, Shaanxi 710075 (CN)

(30) Priority: **10.07.2007 CN 200710018219**

(74) Representative: **Pidgeon, Robert John**
Appleyard Lees
15 Clare Road
Halifax
West Yorkshire HX1 2HY (GB)

(71) Applicant: **Shaanxi J&R Fire Fighting Co., Ltd**
Shaanxi 710075 (CN)

(54) **FIRE-EXTINGUISHING AEROSOL FOR COMMON ELECTRIC APPLIANCE**

(57) A fire-extinguishing aerosol composition for common electric apparatuses is disclosed, which includes oxidant, combustible, adhesive and additive. The composition of the present invention is **characterized in that** the oxidant is the mixture of the potassium salt and the strontium salt, in which the content of the potassium salt oxidant is more than or equal to 15 mass % to less than 20 mass % of the total mass of the composition, and the content of the strontium salt oxidant is more than 48 mass % to less than or equal to 52 mass % of the total mass of the composition. In the fire-extinguishing aerosol

composition of the present invention, the mean particle diameter of all components is less than or equal to 50 μ m. After quenching the fire in a space with the heavy current electric apparatus, the fire-extinguishing aerosol composition of the present invention can ensure that the insulation resistance of the common electric apparatus is ranged from 20M Ω to 100M Ω . The fire-extinguishing aerosol composition of the present invention is more reasonable than the prior art, friendly to the environment, and applicable to the common electric apparatuses.

EP 2 168 638 A1

Description**Field of the Invention**

[0001] The present invention belongs to the technical field of fire-extinguishing compositions, and relates to a fire-extinguishing aerosol composition suitable for extinguishing of Type A or Type B fire in relatively enclosed spaces, in particular, to a fire-extinguishing aerosol composition suitable for general electric apparatuses.

Background of the Invention

[0002] The aerosol fire-extinguishing techniques emerged in the 1990s are fire-extinguishing techniques that are based on the intense oxidation-reduction reaction between oxidant and fuel, and utilize the chemical reaction of the resulted active inhibiting agent to prevent combustion and chain reaction of free radical groups in the flame, so as to achieve the purpose of fire-extinguishing. The aerosol fire-extinguishing technique mainly comprises three types: hot aerosol fire-extinguishing technique, cold aerosol fire-extinguishing technique, and fine water mist fire-extinguishing technique, among which hot aerosol fire-extinguishing techniques comprise pyrotechnic compound-based hot aerosol fire-extinguishing techniques and water-based hot aerosol fire-extinguishing techniques. At present, most pyrotechnic compound-based hot aerosol fire-extinguishing techniques employ solid pyrotechnic compound extinguishing agents composed of oxidant, combustible, adhesive, and combustion rate controller. As a substitute for halon, pyrotechnic compound-based hot aerosol extinguishing agents have significant advantages over other types of extinguishing agents, for example, they have high extinguishing efficiency, the structure of fire-extinguishing equipment is simple, there is no need for pressure container, the fire-extinguishing units can be modularized and combined as required, the extinguishing agents can be stored at normal temperature and normal pressure, the fire-extinguishing equipment is easy to service and maintenance, the extinguishing agents have long shelf life and low cost, no ozone depletion potential (ODP = 0), low greenhouse warning potential (GWP), and high cost/performance. These extinguishing agents are favored in the market and can drive implementation of the halon replacement program.

[0003] In the prior art, nitrate alkali salts, especially potassium nitrate, are the first choice for oxidant in most pyrotechnic compound-based hot aerosol fire-extinguishing techniques, because they can meet the most requirements of the principles for component selection. In existing techniques of fire-extinguishing aerosol composition with single-component potassium nitrate as the oxidant, the most representative hot aerosol fire-extinguishing agent techniques are those disclosed in the Russian series patent group, such as patent applications RU2230726, RU2184587, RU2214848, RU2150310, RU2108124, RU2091106, RU2076761, RU2151135, RU2116095, RU2006239, RU2022589; and patent applications in other countries, such as W00158530, W09733653, W09423800, US5831209, US6042664, US6264772, US5573555, US6116348, etc.; what take the second position are fire-extinguishing aerosol composition techniques that employ bi-component or multi-component oxidants mainly composed of potassium nitrate and/or potassium perchlorate and/or assisted with nitrates or carbonates of other alkali metals or alkaline earth metals, as disclosed in patent applications such as CA2250325, DE19915352, UA7773, EP0561035, W02005023370, RU2157271, RU2098156, US20020121622, US5423385, US5492180, US5425426, US6277296, etc. As for selection of combustibles, there is a wide range of substances that can meet the principle for component selection. The organic or inorganic combustibles that can meet the requirements are selected on the premise of ensuring negative oxygen balance design, such as the combustibles disclosed in patent applications RU218458, RU2214848, US20010011567, US6264772, RU2157271, RU2050878, US5831209, W09733653, EP0561035, etc. With respect to the water-based hot aerosol fire extinguishing agent techniques, the oxidants and combustibles selected are typically composed of ammonium nitrate, ammonium perchlorate, potassium nitrate, strontium nitrate, or guanidine nitrate and like components that can generate gas, moisture content, and metal solid particles on the premise of ensuring high oxygen balance design, such as those disclosed in patent applications US6277296, US6093269, US6045726, US6019861, US5613562, etc.

[0004] Above patented hot aerosol fire-extinguishing techniques were fire-extinguishing products favored in recent years for their advantageous features of high extinguishing efficiency, low price, convenient maintenance, etc. However, as the market application and further development of actual products, many drawbacks of existing techniques and products described above have been discovered. Recently, a great deal of application practices and research efforts have shown: fire-extinguishing agents with single-component or multi-component oxidants mainly composed of potassium nitrate produce strongly alkaline conductive substances (e.g., potassium hydroxide) that can cause secondary damage to the space and objects to be protected, although they have high fire-extinguishing efficiency. Especially, the moisture content and metal oxides produced by water-based hot aerosol fire-extinguishing agents tend to form strongly alkaline conductive substances, which may lead to damage or erode general electric apparatuses in instrument rooms, control rooms, generator rooms, battery cabinets, communication base stations, transformer substations, etc., and thereby result in irreparable consequences, when these products are used to extinguish fire in such environments. Moreover, if the resulting nitrous oxide can't be decomposed timely, it will have toxicity to human's nerve system. In

view of the problems, some research institutions and manufacturers have put forth some hot aerosol fire-extinguishing schemes that have taken both fire-extinguishing efficiency and secondary damages into consideration, such as the technical scheme of aerosol fire-extinguishing agent with strontium nitrate as the only oxidant, as disclosed in patent application CN200510105449. However, the most severe drawback of that technical scheme is: though the technical scheme reduces secondary damages to general electric apparatuses, it severely degrades the fire-extinguishing efficacy of the fire-extinguishing agent. The fire-extinguishing compositions disclosed in patent application US5613562 and US5609210 employ strontium nitrate as the oxidant, which mainly acts as a power source to gasify another fire-extinguishing liquid that contains C-F bonds and C-H-F bonds and then spurt the liquid/gas to the fire; however, the resulting hydrofluoric acid has not only high toxicity but also high corrosibility. That technique belongs to a water-based hot aerosol fire-extinguishing technique. Though the fire-extinguishing composition disclosed in patent application US6019861 contains potassium nitrate or strontium nitrate component, the potassium nitrate or strontium nitrate component is only used as an additive or a co-oxidant, and the main oxidant is ammonium nitrate that must be subjected to phase stabilization; in addition, the main purpose of the potassium nitrate or strontium nitrate component is to provide high quality dilating gas. Though the fire-extinguishing composition has an advantage of lower temperature when it is used in the fire-extinguishing technique, it degrades the combustion rate and the gas generation rate. A pyrotechnic gas generating agent with high oxygen balance is disclosed in patent application US6093269. In the pyrotechnic gas generating agent, the highly concentrated strontium nitrate is mainly used to keep neutral balance between oxygen and fuel; the pyrotechnic gas generating agent is mainly used in propelling agent compounds for automobiles, gun thrusters, expansion devices, and air bags.

[0005] Existing techniques that are close to the technical scheme of the present invention are the techniques disclosed in patent applications CN1739820A, CN1150952C, and

[0006] CN1222331C, wherein, CN1150952C and CN1222331C are former patent applications of the inventor. A drawback of the two techniques disclosed in patent applications CN1150952C and CN1222331C is: in terms of balance between fire-extinguishing efficacy and corrosion to electric apparatuses, no specific design is provided for the requirements for insulation of different electric apparatuses. However, different types of electric apparatuses have different withstand capability against electrostatic accumulation or acid-alkali corrosion at different severity levels; for example, for heavy current electric apparatuses such as generators, electric motors, high voltage or low-voltage apparatuses, electric networks, and cables, the insulation resistance usually should be $\geq 1\text{M}\Omega$ and $\leq 20\text{M}\Omega$ (see the standards of electric power industry of P. R. C., such as "Code for Quality Inspection and

[0007] Assessment of Electric Apparatus Installation Engineering (Inspection of Engineering Quality of Rotating Motors)" (DL/T5161.7-2002), etc.); for general electric apparatuses such as communication apparatuses, computers, onboard electric apparatuses, and electric medical apparatuses, etc., the insulation resistance usually should be $\geq 20\text{M}\Omega$ and $< 100\text{M}\Omega$ (see standards of electronic industry of P. R. C. and standards of communication industry of P. R. C., standards of computer industry of P. R. C., such as "General Code for Semi-Conductor Integrated Circuits" (GB6649-86), "Handbook of Surface Insulation Resistance" (IPC9201), etc.); for precision electric apparatuses such as instruments and gauges and their substrates and PCBs, the insulation resistance usually should be $\geq 100\text{M}\Omega$ (see standards of electronic industry of P. R. C., international standards of printed circuit industry, such as "Handbook of Insulation Performance and Quality of Electric Apparatuses for Printed Circuit Board Assembly" (IPC-CC-8308), "Requirements for Safety of Electronic Measuring Instruments" (GB4793), and "General Specification for General-Purpose Printed Circuit Board Connectors" (GJB 1717-93), etc.). Since different electric apparatuses have different requirements for insulation resistance, it is inappropriate to use a fire-extinguishing composition with the same components for different electric apparatuses in terms of fire-extinguishing efficacy and cost. Therefore, the fire-extinguishing compositions disclosed in former patent applications of the inventor are not perfect in terms of the design of components and contents, and must be refined for some technical features and parameters. In the prior art, no special technique on fire-extinguishing aerosol composition that can prevent or reduce secondary damages to electric apparatuses while not compromising the fire-extinguishing efficacy is found, except for the techniques described above.

Summary of the Invention

[0008] In view of the drawbacks in the prior art, the object of the present invention is to provide a fire-extinguishing aerosol composition, which is more reasonable than those in the prior art, more environment-friendly, suitable for general electric apparatuses, and has high fire-extinguishing efficacy.

[0009] The inventor's in-depth study on hot aerosol fire-extinguishing technique in recent years has shown: the effective fire-extinguishing concentration depends on the quality and intrinsic physical and chemical properties of the fire-extinguishing agent.

[0010] The combustion rate of the extinguishing agent depends on factors such as oxygen balance design and selection of oxidant and combustible, etc. To achieve the object of the present invention, more in-depth work must be done in several aspects: (1) design the fire-extinguishing capability with full consideration of ignition, safety, and chemical com-

patibility; (2) employ an oxidant that doesn't contain potassium salts solely, under the design principle of negative oxygen balance; (3) simplify the composition of compound as far as possible so as to avoid production of undesired substances.

[0011] By careful selection of oxidant and combustible, adjustment and tests of combustion reaction rate, tests of residue of fire-extinguishing aerosol, cooling tests, fire-extinguishing powder tests, moisture absorption and insulation tests of solid particles, etc., the inventor finally determine the technical scheme of aerosol fire-extinguishing compound applicable to general electric apparatuses described in the present invention.

[0012] The fire-extinguishing aerosol composition provided in the present is suitable for general electric apparatuses, and comprises oxidant, combustible, adhesive, and additive; wherein, the oxidant in the fire-extinguishing composition is a mixture of potassium salt oxidant and strontium salt oxidant; the combustible is guanidine nitrate, aminoguanidine nitrate, diaminoguanidine nitrate, or a combination thereof; the additive is aluminum powder, carbon powder, calcium carbonate, or a combination thereof; the adhesive is epoxy resin, phenolic resin, acrylic resin, or a combination thereof; in addition, the weight percents of the components in the fire-extinguishing compound are:

Potassium salt oxidant:	≥15% and <20%;
Strontium salt oxidant:	≥48% and <52%;
Combustible:	10%~25%;
Additive:	2%~10%; and
Adhesive:	2%~10%.

Detailed Description of the Invention

[0013] The strontium salt that can be used in the fire-extinguishing composition is strontium nitrate, strontium peroxide, strontium carbonate, strontium sulphite, strontium pyrophosphate, strontium bromide, strontium dichromate, strontium hexaboride, strontium permanganate, or a combination thereof; the potassium salt is potassium nitrate, potassium chlorate, potassium perchlorate, potassium chloride, potassium nitrite, potassium carbonate, potassium citrate, or a combination thereof; alternatively the potassium salt oxidant can be partially or completely replaced with sodium bicarbonate, sodium nitrate, sodium perchlorate, ammonium nitrate, ammonium perchlorate, barium nitrate, cesium nitrate, or a combination thereof.

[0014] The combustible that can be used in the fire-extinguishing composition in the present invention can be partially or completely replaced with pentaminotetrazole or salt thereof, bistetrazole or salt thereof, diazoaminotetrazole or salt thereof, diaminotetrazole dimer or salt thereof, or a combination thereof.

[0015] The additive that can be used in the fire-extinguishing composition in the present invention can be partially or completely replaced with pyrocatechol potassium borate or salt thereof, hydroxybenzoic acid or salt thereof, benzoic acid or salt thereof, palmitic acid or salt thereof, ammonium nitrate, potassium perchlorate, potassium chloride, copper oxide, ferric oxide, copper phthalocyanine, potassium ferricyanide, hexamethylenetetramine, or a combination thereof.

[0016] The adhesive that can be used in the fire-extinguishing composition in the present invention can be partially or completely replaced with polytetrafluoroethylene, ethylene polymer, nitrocellulose, trialdehyde glyceride, polyvinyl acetate, melamine resin, or a combination thereof.

[0017] The maximum mean diameter of oxidant, combustible, additive, and adhesive particles in the fire-extinguishing composition in the present invention is ≤50μm.

[0018] In another preferred embodiment of the present invention, the fire-extinguishing aerosol composition comprises:

Potassium nitrate:	15%~19%;
Strontium nitrate:	48%~51%;
Guanidine nitrate:	10%~25%;
Aluminum powder:	2%~10%; and
Phenolic resin:	2%~10%.

[0019] In another preferred embodiment of the present invention, the fire-extinguishing aerosol composition comprises:

Potassium perchlorate:	15%~19%;
Strontium peroxide:	48%~51%;
Aminoguanidine nitrate:	10%~25%;
Hydroxybenzoic acid or salt thereof:	2%~10%; and
Acrylic resin:	2%~10%.

[0020] In another preferred embodiment of the present invention, the fire-extinguishing aerosol composition comprises:

Potassium nitrite: 15%~19%;
 Strontium permanganate: 48%~51%;
 Pentaminotetrazole or salt thereof: 10%~25%;
 Ferric oxide: 2%~10%; and
 Epoxy resin: 2%~10%.

[0021] In another preferred embodiment of the present invention, the fire-extinguishing aerosol composition comprises:

Potassium carbonate: 15%~19%;
 Strontium pyrophosphate: 48%~51%;
 Diazoaminotetrazole or salt thereof: 10%~25%;
 potassium ferricyanide: 2%~10%; and
 Polytetrafluoroethylene: 2%~10%.

[0022] After the fire in a space with the general electric apparatus is extinguished with the fire-extinguishing aerosol composition provided in the present invention, the insulation resistance of the general electric apparatus is 20~100MΩ.

[0023] The technical scheme of fire-extinguishing aerosol composition suitable for general electric apparatuses is determined by the inventor through careful selection and tests on components and mixing ratios of oxidant, combustible, adhesive, and additive. The results of repeated tests demonstrated that the insulation resistance of general electric apparatuses was greater than 20MΩ after the fire was extinguished. Compared to the prior art, the fire-extinguishing aerosol composition provided in the present invention attains achieves the object of avoiding secondary damages to general electric apparatuses after the fire is extinguished, while not compromising the fire-extinguishing efficacy, and is a new generation of special and high-efficiency fire-extinguishing aerosol composition.

Detailed Description of the Examples

[0024] Hereunder the present invention will be described in details with reference to the examples. However, these examples shall not be deemed to constitute any limitation to the scope of the present invention.

[0025] The fire-extinguishing aerosol composition suitable for general electric apparatuses in the present invention was prepared according to the formula shown in the following table, and the insulation resistance of precipitant was measured as indicated in the following description.

Component Name	Weight Percent of Component / %									
	Eexample 1	Eexample 2	Eexample 3	Eexample 4	Eexample 5	Eexample 6	Eexample 7	Eexample 8	Eexample 9	Eexample 10
Potassium perchlorate		19						15		
Potassium nitrate	18									18
Potassium carbonate				19						
Potassium nitrite			18							
Potassium chlorate										
Potassium citrate							18			
Potassium bicarbonate						19				

EP 2 168 638 A1

(continued)

5	Component Name	Weight Percent of Component / %									
		Eexample 1	Eexample 2	Eexample 3	Eexample 4	Eexample 5	Eexample 6	Eexample 7	Eexample 8	Eexample 9	Eexample 10
	Barium nitrate					17					
10	Sodium nitrate									16	
	Strontium nitrate	51									50
15	Strontium peroxide		48								
	Strontium carbonate					50					
20	Strontium pyrophosphate				51		49				
	Strontium bromide								51		
25	Strontium permanganate			51				50		51	
	Aminoguanidine nitrate		23								
30	Guanidine nitrate	22				23		22			20
	Pentaminotetrazole			22			21		25		
35	Diazoaminotetrazole				23					24	
	Aluminum powder	5								4	
40	Ferric oxide			4		5					
	Hydroxybenzoic acid		4								6
45	Copper oxide						5				
	Potassium ferricyanide				2				3		
	Hexamethylenetetramine							5		5	
50	Acrylic resin		6								6
	Polytetrafluoroethylene				5	5			6		
55	Epoxy resin			5				5			

(continued)

Component Name	Weight Percent of Component / %									
	Eexample 1	Eexample 2	Eexample 3	Eexample 4	Eexample 5	Eexample 6	Eexample 7	Eexample 8	Eexample 9	Eexample 10
Phenolic resin	4					6				
Insulation resistance value of precipitant	60 MΩ	67 MΩ	80 MΩ	70 MΩ	70 MΩ	66 MΩ	59 MΩ	72 MΩ	58 MΩ	58 MΩ
Note: 1. Acrylic resin: Type 104, produced by Xi'an Resin Plant; polytetrafluoroethylene: grain type, produced by Sichuan Chengguang Plant; epoxy resin: type E51, produced by Dalian Qihua Plant; phenolic resin: type F-23, produced by Hangzhou Shunxiang Plant. 2. Measure of the insulation resistance of precipitant of fire-extinguishing aerosol was carried out according to Clause 10.2 in GB499.1-2007. The testing devices included a test chamber (1 M³ (1×1×1m)), a megohmmeter with a measuring range of 0.1MΩ-500MΩ (ZC36 megohmmeter produced by Shanghai Precision Instrument Plant), culture dishes, a precision balance, and an aerosol generator. 3. The sample plates were 100×100×1mm white PVC plates; 100g aerosol generation agent was pressed into a cartridge with a diameter of 40mm and a height of 100mm under a pressure of 5Mpa, and an electric starter was then equipped into the cartridge; next, the cartridge was placed into a mini-type generator; no coolant was added into the generator. 4. In the test, a clean sample plate was placed into a culture dish with nippers. The culture dish was placed on a test stand with a height of 250mm in the center of a test chamber. The generator was placed at a corner in the test chamber, with the nozzle placed against the sample plate; the power wires were connected and the door of test chamber was closed; the device was powered on while counting the time with a second counter. After 20min., the culture dish with the sample plate was taken out and the culture dish was removed into an environmental chamber at 35°C temperature and 90% humidity and held for 30min.; then, the test sample was taken out and the resistance was measured immediately.										

Claims

1. A fire-extinguishing aerosol composition suitable for general electric apparatuses, comprising oxidant, combustible, adhesive, and additive; wherein, the oxidant in the fire-extinguishing compound is a mixture of potassium salt oxidant and strontium salt oxidant; the combustible is selected from guanidine nitrate, aminoguanidine nitrate, diaminoguanidine nitrate, or a combination thereof; the additive is selected from aluminum powder, carbon powder, calcium carbonate, or a combination thereof; the adhesive is selected from epoxy resin, phenolic resin, acrylic resin, or a combination thereof; in addition, the weight percents of the components in the fire-extinguishing composition are:

Potassium salt oxidant: ≥15% and <20%;
 Strontium salt oxidant: ≥48% and <52%;
 Combustible: 10%~25%;
 Additive: 2%~10%; and
 Adhesive: 2%~10%.

2. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to claim 1, wherein, the strontium salt is strontium nitrate, strontium peroxide, strontium carbonate, strontium sulphite, strontium pyrophosphate, strontium bromide, strontium dichromate, strontium hexaboride, strontium permanganate, or a combination thereof.
3. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to claim 1, wherein, the potassium salt is potassium nitrate, potassium chlorate, potassium perchlorate, potassium chloride, potassium

nitrite, potassium carbonate, potassium citrate, or a combination thereof.

4. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-3, wherein, the potassium salt oxidant is partially or completely replaced with sodium bicarbonate, sodium nitrate, sodium perchlorate, ammonium nitrate, ammonium perchlorate, barium nitrate, cesium nitrate, or a combination of them.
5. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-3, wherein, the combustible is partially or completely replaced with pentaminotetrazole or salt thereof, bitetrazole or salt thereof, diazoaminotetrazole or salt thereof, diaminotetrazole dimer or salt thereof, or a combination thereof.
6. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-3, wherein, the additive is partially or completely replaced with pyrocatechol potassium borate or salt thereof, hydroxybenzoic acid or salt thereof, benzoic acid or salt thereof, palmitic acid or salt thereof, ammonium nitrate, potassium perchlorate, potassium chloride, copper oxide, ferric oxide, copper phthalocyanine, potassium ferricyanide, hexamethylenetetramine, or a combination thereof.
7. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-3, wherein, the adhesive is partially or completely replaced with polytetrafluoroethylene, ethylene polymer, nitrocellulose, trialdehyde glyceride, polyvinyl acetate, melamine resin, or a combination thereof.
8. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-7, wherein, the maximum mean diameter of the oxidant, combustible, adhesive, and additive particles is smaller than or equal to 50 μ m.
9. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-7, wherein, after the fire-extinguishing aerosol composition is used to extinguish fire in a space with the general electric apparatus, the insulation resistance of the general electric apparatus is within the range of 20~100M Ω .
10. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-7, wherein, the composition comprises:

Potassium nitrate:	15%~19%;
Strontium nitrate:	48%~51%;
Guanidine nitrate:	10%~25%;
Aluminum powder:	2%~10%; and
Phenolic resin:	2%~10%.

11. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-7, wherein, the composition comprises:

Potassium perchlorate:	15%~19%;
Strontium peroxide:	48%~51%;
Aminoguanidine nitrate:	10%~25%;
Hydroxybenzoic acid or salt thereof:	2%~10%; and
Acrylic resin:	2%~10%.

12. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1-7, wherein, the composition comprises:

Potassium nitrite:	15%~19%;
Strontium permanganate:	48%~51%;

(continued)

Pentaminotetrazole or salt thereof: 10%~25%;
 Ferric oxide: 2%~10%; and
 Epoxy resin: 2%~10%.

13. The fire-extinguishing aerosol composition suitable for general electric apparatuses according to any one of claims 1~7, wherein, the compound comprises:

Potassium carbonate: 15%~19%;
 Strontium pyrophosphate: 48%~51%;
 Diazoaminotetrazole or salt thereof: 10%~25%;
 Potassium ferricyanide: 2%~10%; and
 Polytetrafluoroethylene: 2%~10%.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2007/003212

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A62D1/06, A62D1/-, A62D, A62C3/00, A62C,

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, PAJ, CNPAT, CNKI fire w (fight+ or extinguish+ or suppress+ or proof+), aerosol, strontium or sr, potassium or k,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN1386554 A(Guo, Hongbao), 25 Dec. 2002(25.12.2002), claims 4 and 5	1-3, 10
Y		4-6
Y	CN1526461 A(Guo, Hongbao), 08 Sep. 2004(08.09.2004), claims 3 and 4	4-5
Y	CN1739820 A(Song, Yongchang et al.), 01 Mar. 2006(01.03.2006), claims 1 and 3	6
A	US5613562 A(AEROJET GEN CORP et al.), 25 Mar. 1997(25.03.1997), the whole document	1-13

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

04 Mar. 2008(04.03.2008)

Date of mailing of the international search report

17 Apr. 2008 (17.04.2008)

Name and mailing address of the ISA/CN
The State Intellectual Property Office, the P.R.China
6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China
100088
Facsimile No. 86-10-62019451

Authorized officer

Zhang, Jingde

Telephone No. (86-10)62084561

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2007/003212

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN1386554 A	25.12.2002	CN1150952 C	26.05.2004
CN1526461 A	08.09.2004	CN1222331 C	12.10.2005
CN1739820 A	01.03.2006	None	
US5613562 A	25.03.1997	WO9500205 A1	05.01.1995
		AU7106094 A	17.01.1995
		US5423384 A	13.06.1995
		US5449041 A	12.09.1995
		US5465795 A	14.11.1995
		EP0705120 A1	10.04.1996
		EP0705120 A4	24.07.1996
		JP9500296 T	14.01.1997
		US5609210 A	11.03.1997
		EP0705120 B1	17.04.2002
		DE69430426 E	23.05.2002
		CA2501443 A1	05.01.1995
		CA2501448 A1	05.01.1995
		CA2501457 A1	05.01.1995
		CA2501474 A1	05.01.1995
		CA2165320 C	15.11.2005
		CA2501443 C	17.10.2006
		CA2501448 C	17.10.2006
		CA2501457 C	17.10.2006
		CA2501474 C	17.10.2006
		DE69430426 D	23.05.2002
		DE69430426 T	12.12.2002

Form PCT/ISA/210 (patent family annex) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2007/003212

CLASSIFICATION OF SUBJECT MATTER:

A62D1/06 (2006.01) i

A62C3/00 (2006.01) i

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- RU 2230726 [0003]
- RU 2184587 [0003]
- RU 2214848 [0003]
- RU 2150310 [0003]
- RU 2108124 [0003]
- RU 2091106 [0003]
- RU 2076761 [0003]
- RU 2151135 [0003]
- RU 2116095 [0003]
- RU 2006239 [0003]
- RU 2022589 [0003]
- WO 0158530 A [0003]
- WO 9733653 A [0003]
- WO 9423800 A [0003]
- US 5831209 A [0003]
- US 6042664 A [0003]
- US 6264772 B [0003]
- US 5573555 A [0003]
- US 6116348 A [0003]
- CA 2250325 [0003]
- DE 19915352 [0003]
- UA 7773 [0003]
- EP 0561035 A [0003]
- WO 2005023370 A [0003]
- RU 2157271 [0003]
- RU 2098156 [0003]
- US 20020121622 A [0003]
- US 5423385 A [0003]
- US 5492180 A [0003]
- US 5425426 A [0003]
- US 6277296 B [0003]
- RU 218458 [0003]
- US 20010011567 A [0003]
- RU 2050878 [0003]
- US 6093269 A [0003] [0004]
- US 6045726 A [0003]
- US 6019861 A [0003] [0004]
- US 5613562 A [0003] [0004]
- CN 200510105449 [0004]
- US 5609210 A [0004]
- CN 1739820 A [0005]
- CN 1150952 C [0005] [0006]
- CN 1222331 C [0006]